CLAIMS

What is claimed is:

1. A projection display system for projecting images by scanning light beams onto a projection plane, comprising:

a solid state light source unit emitting a red monochrome light beam, a green monochrome light beam, and a blue monochrome light beam;

an image processing unit receiving a composite image signal and generating color intensity signals, horizontal synchronization signals, and vertical synchronization signals;

an optical modulation unit modulating the red, the green, and the blue monochrome light beams to desired tones and hues according to the color intensity signals received from the image processing unit;

an optical synthesizing device combining the light beams into one single light beam;

a reflecting mirror unit scanning the one single light beam horizontally and vertically to form a two-dimensional image;

a reflecting mirror controller unit for driving the scanning motion of the reflecting mirror according to the position control signals received from the image processing unit; and

a sensing unit for detecting speed and position of the reflecting mirror unit, wherein the image signal processing unit coordinates a feedback signal from the sensing unit with the position control signals to avoid jitter of the projected image.

2. The system of claim 1, wherein the solid state light source unit comprises solid state light sources selected from the group consisting of semiconductor edge emitting laser diodes (LD), vertical cavity surface emitting laser diodes (VCSEL), diode pumped solid state frequency

doubled (DPSSFD) lasers, and light emitting diodes (LED).

3. The system of claim 2, wherein the red, the green, and the blue monochrome light beams travel in free space before they are combined into the one single light beam by the optical synthesizing device.

4. The system of claim 2, wherein the red, the green, and the blue monochrome light beams travel in optical fibers before they are combined into the one single light beam by the optical synthesizing device.

5. The system of claim 4, wherein the one single light beam travel in an optical fiber before striking the reflecting mirror unit.

6. The system of claim 1, wherein the image signal processing unit comprises:

a decoder for dividing a composite image signal into a composite synchronous signal, a red signal, a green signal, and a blue signal;

a signal separator for separating the composite synchronous signal into a horizontal synchronization signal and a vertical synchronization signal;

a read/write controller synchronizing the vertical and the horizontal synchronization signals with the position and the speed of the reflecting mirror unit; and

a memory for buffering the red, the green, and the blue signals.

7. The system of claim 1, wherein the optical modulation unit modulates the red, the green and the blue monochrome light beams independently, and comprises modulators selected from the group consisting of acoustic-optic modulators, electro-optic modulators, and magneto-optic modulators.

8. The system of claim 6, wherein the optical modulation unit is a set of electrical circuitry controlled by the read/write controller of the image processing unit, the optical modulation unit directly modulating timing, duration, and intensity of electrical driving pulses of the solid state

light source unit.

9. The system of claim 1, wherein the reflecting mirror unit is selected from the group consisting of:

a bi-directional micro-electro-mechanical system (MEMS) scanning mirror;

a first MEMS scanning mirror rotating about a horizontal axis and a second MEMS scanning mirror rotating about a vertical axis; and

at least one galvanometer mirror manufactured by mechanical processes.

10. The system of claim 1, wherein the sensing unit comprises an optical detector that detects the scanning speed and the position of one of the selected monochrome light beam.

11. The system of claim 1, wherein the sensing unit comprises a plurality of optical detectors that detect the horizontal and the vertical motion of the reflected light beams.

12. The system of claim 1, wherein the sensing unit comprises an optical detector and a second solid-state light source unit, wherein the optical detector determines a horizontal scanning motion by detecting a light beam emitting from the second light source unit and reflected by the reflecting mirror unit.

13. The system of claim 1, wherein the sensing unit comprises a plurality of optical detectors and a second solid state light source unit, wherein the optical detectors determine horizontal and vertical scanning motions by detecting the light beam emitted by the second light source unit and reflected by the reflecting mirror unit.

14. The system of claim 1, wherein the sensing unit is embedded in the reflecting mirror unit, wherein the reflecting mirror unit generates electrical feedback signals used to determine the speed and the position of the reflecting mirror unit during scanning motions.

15. The system of claim 1, further comprising:

a plurality of solid state light source units wherein each unit emitting red, green, and blue monochrome light beams;

a plurality of optical modulation units corresponding to each solid state light source unit for modulating the corresponding monochrome light beams according to the corresponding color control signals received from the image processing unit;

a plurality of optical synthesizing devices corresponding to each solid state light source unit for combining the corresponding monochrome light beams into corresponding single light beams;

wherein the projected image is comprised of multiple image tiles generated by the single light beams reflecting from the reflecting mirror unit, the solid state light source units are oriented such that the resulting image tiles form a seamless image.

16. The system of claim 1, further comprising:

a translucent screen as the projection plane of the image;

a plurality of diffusers and lenses that expand and reflect the projected image to the translucent screen; and

a casing that encloses the projection display system.

17. A projection illumination system comprising:

a solid state light source unit emitting at least one light beam; and

a reflecting mirror unit for scanning the light beam over an image to illuminate the image.

18. The system of claim 17, wherein the solid state light source unit comprises at least one solid state light source selected from the group consisting of semiconductor edge emitting laser diodes (LD), vertical cavity surface emitting laser diodes (VCSEL), diode pumped solid state frequency doubled (DPSSFD) lasers, and light emitting diodes (LED) for desired color.

19. The system of claim 17, wherein the reflecting mirror unit is selected from the group

consisting of:

a bi-directional micro-electro-mechanical system (MEMS) scanning mirror;

a first MEMS scanning mirror rotating about a horizontal axis and a second MEMS scanning mirror rotating about a vertical axis; and

at least one galvanometer mirror manufactured by mechanical processes.

20. The system of claim 17, wherein the image is on a medium selected from the group consisting of a wall, a screen, a sign, and a billboard.

21. The system of claim 17, wherein the image comprises a semi-transparent material so the image can be viewed on both sides.

22. The system of claim 17, wherein the image is a semi-transparent image and the image is projected onto a medium to create a larger image.

23. The system of claim 17, further comprising:

a second solid state light source unit emitting at least a second light beam;

a second reflecting mirror unit for scanning the second light beam over the image to illuminate the image;

wherein the reflecting mirror unit illuminates a first portion of the image while the second reflecting mirror unit illuminates a second portion of the image.

24. The system of claim 23, wherein the projection illumination system comprises one of an overhead projector, an LCD projector, and a slide machine.

25. The system of claim 17 further comprising:

a light-valve device;

wherein the light beam scans over the light-valve device to project the image modulated by the light-valve device.

26. The system of claim 25, wherein the light-valve device is selected from the group consisting of a liquid crystal display (LCD) device, a liquid crystal on silicon (LCoS) device, and a digital micromirror device (DMD).

27. A light source, comprising:

a light source emitting a light beam; and

a reflecting mirror system for raster scanning the light beam over an area to be illuminated.

28. The light source of claim 27, wherein the light source and the reflecting mirror are powered by a battery.

29. The light source of claim 27, wherein the light source comprises at least one laser diode selected from the group consisting of a semiconductor edge emitting laser diodes (LD), a vertical cavity surface emitting laser diodes (VCSEL), and a light emitting diodes (LED).

30. The light source of claim 27, wherein the reflecting mirror system is selected from the group consisting of:

a bidirectional MEMS scanning mirror;

a first MEMS scanning mirror rotating about a horizontal axis and a second MEMS scanning mirror rotating about a vertical axis; and

at least one galvanometer mirror manufactured by mechanical processes.

31. The light source of claim 27, wherein the light source generates an infrared light beam.

32. A method for illuminating an area, comprising:

generating a light beam; and

raster scanning the light beam over the area to illuminate the area.

33. The method of claim 32, further comprising powering a light source that generates the

light beam and a reflecting mirror system that raster scans the light beam with a battery.

34. The method of claim 32, wherein said scanning the light beam over the area is a step selected from the group consisting of:

rotating a bidirectional MEMS scanning mirror along two axes to scan the light beam;

rotating a first MEMS scanning mirror along a horizontal axis and rotating a second MEMS scanning mirror along a vertical axis to scan the light beam; and

rotating at least one galvanometer mirror manufactured by mechanical processes.

35. The method of claim 32, wherein the light beam is an infrared light beam.